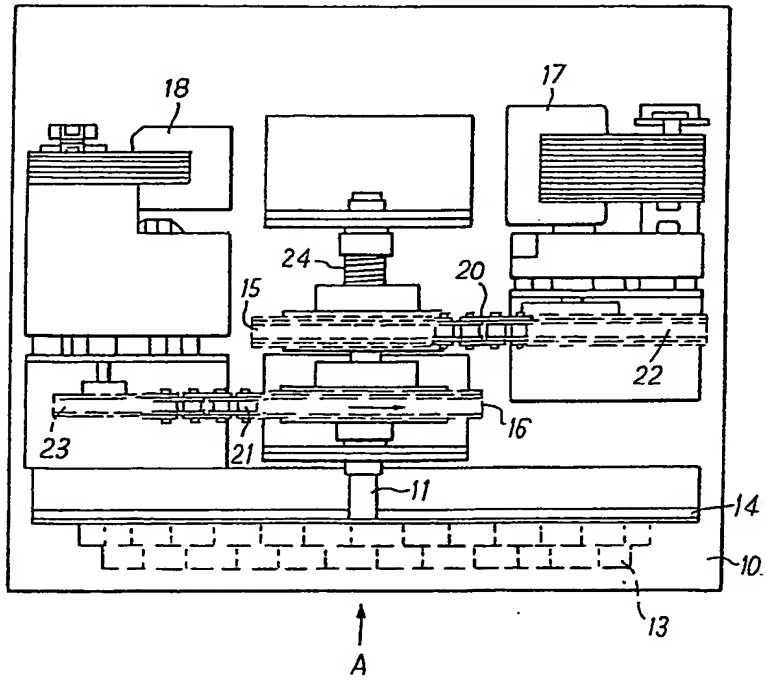
(12) UK Patent Application (19) GB (11) 2 059 520 A

(21) Application No 7933973
(22) Date of filing 1 Oct 1979
(43) Application published
23 Apr 1981
(51) INT CL³
F16H 7/06
(52) Domestic classification
F2D 7A3 7E1
H2A TJ
(56) Documents cited
GB 1520104
GB 1512251
GB 1512202
GB 1480802
GB 1033157
GB 947443
GB 741776
GB 729117
(58) Field of search
F2C
F2D
F2L
H2A
(71) Applicant
Alfred Crompton, Amusement Machines Limited, Wilton Road, Haine, Ramsgate, Kent, England
(72) Inventor
Colin Graham Kirby
(74) Agent
J. F. Williams & Co., 34 Tavistock Street, London, WC2E 7PB

(54) A Two-speed Drive Mechanism

(57) A load is slowed in a controlled manner by a drive mechanism which comprises an output shaft 11 which is initally driven at a relatively high speed by a first motor 17; when motor 17 is switched off the shaft slows down until it reaches a substantially lower speed at which it is driven by a second motor 18. The load is then stopped by D.C. braking of motor 18. The motors 17,18 are coupled to shaft 11 by respective free-wheel drives comprising pinions 15,16 and chains 20,21. As described the drive mechanism is part of a gaming machine and the time between switching off motor 17 and braking motor 18 may be set randomly. Shaft 11 carries an arm (12, Fig. 2 not shown) which operates micro-switches connected to flashing lights.

FIG. 1



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

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FIG. 1

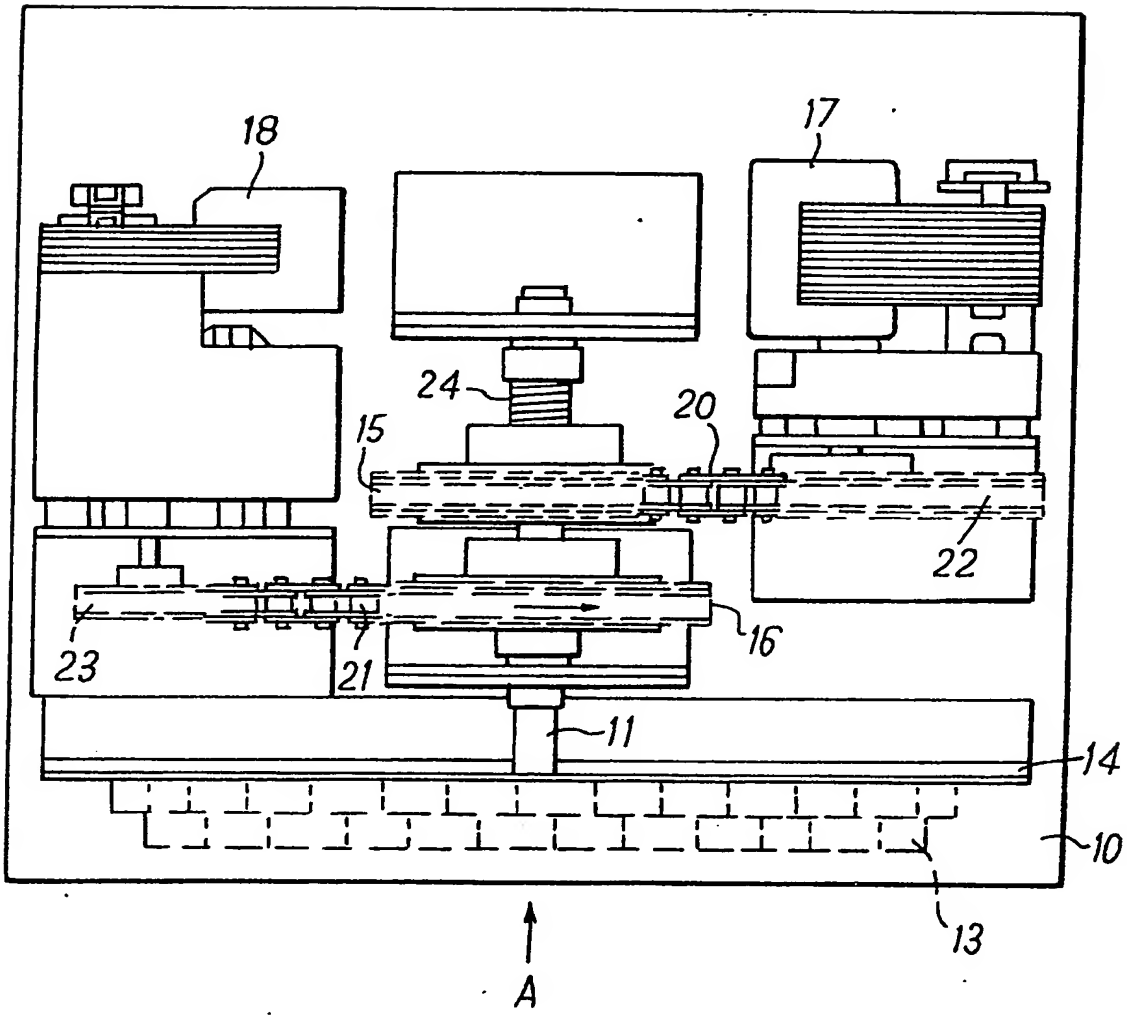


FIG. 2

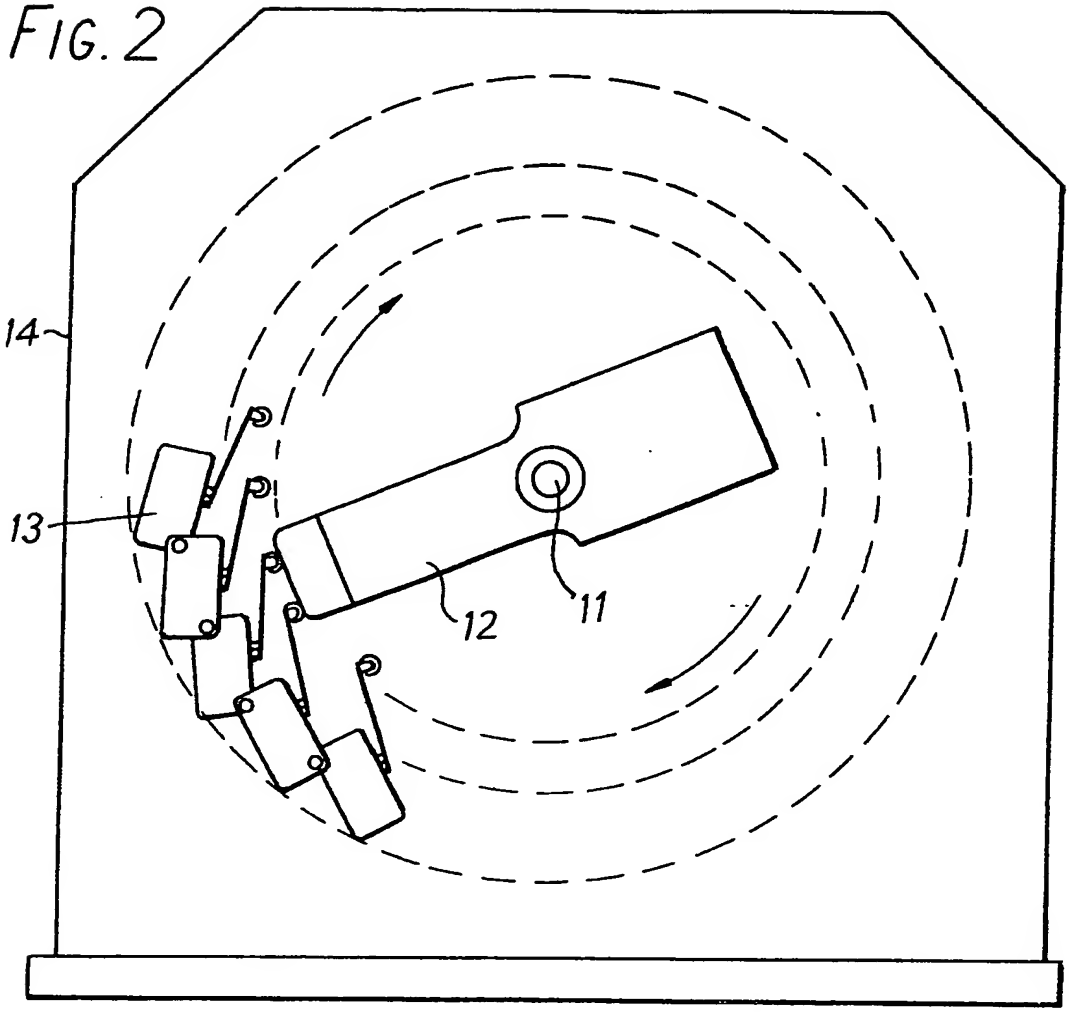
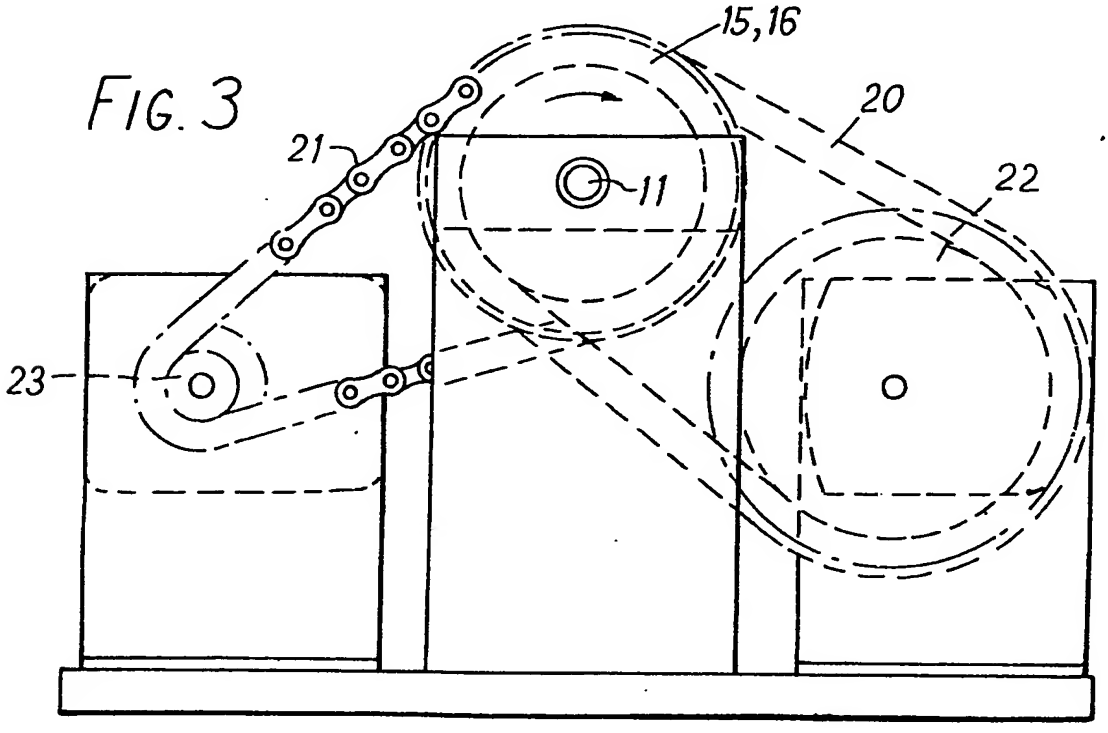


FIG. 3



SPECIFICATION

A Drive Mechanism

The invention relates to a drive mechanism which is particularly suitable for a selector device used in a gaming machine. The mechanism may have other applications.

It is required in a gaming machine to produce sequential flashing of a number of lights. The flashing slowing and then terminating at a specified instant which coincides with the termination of a period of random length determined by a timing circuit. Using a wiper arm to actuate a circular array of switches, it has proved difficult to terminate the flashing accurately in coincidence with the desired period simply using a brake on the drive to the arm.

In fact, it is important to ensure that the final slow down and stop are effected under controlled slow driver of the wiper arm, rather than to allow the latter simply to be de-energised, or simply mechanically braked. In order that the invention shall be clearly understood, an exemplary embodiment thereof will now be described with reference to the accompanying drawings, in which:

Figure 1 is a plan view of a mechanism according to the invention;

Figure 2 is an elevation in direction A of the mechanism in Figure 1; and

Figure 3 is an elevation in direction A, with the flashing light selector removed.

As seen in Figures 1 and 2, the mechanism is mounted on a baseplate 10 and comprises a drive shaft 11 carrying a wiper arm 12 which actuates two at a time of an array of microswitches 13 mounted on an upstanding plate 14. The drive shaft carries two toothed pinions 15, 16, which are linked by free-wheel drives to the drive shaft 10. Each pinion is separately driven by an electric motor 17, 18, via chains 20, 21 and drive pinions 22, 23, respectively. A damping spring 24 takes up the free play on the shaft 10.

The motor 17 has a speed of 16 rpm, and the pinion gearing converts the drive speed at the shaft 10 to

$$16 \times \frac{23}{18} = 20.4 \text{ rpm.}$$

The motor 18 has a speed of 10 rpm, which is converted to

$$10 \times \frac{7}{18} = 3.9 \text{ rpm.}$$

Thus, when both motors are energised, motor 17 drives the shaft, while pinion 16 free wheels at a lesser speed.

In operation, after a randomly selected time, the power to motor 17 is cut off and the friction of the system slows down the shaft until it reaches the speed of pinion 16. Since motor 18 remains energized, this then takes over the drive for a further short period. Finally, the system is braked, preferably by DC braking of motor 18. This stops the shaft and the wiper arm effectively instantaneously.

The mechanism ensures that the slowing down and final stop occur in a controlled fashion, and in coincidence with the period decided by the timing circuit. The D.C. injection braking can be effected by signal from the latter.

Claims

1. A drive mechanism for slowing a load in a controlled manner having an output shaft arranged to be coupled to a load and at least first and second motors which can be coupled to the output shaft by selectively-engageable coupling means, the arrangement being such that when the output shaft is coupled to the second motor it is driven at a substantially lower rotary speed than when it is coupled to the first motor.

2. A drive mechanism according to Claim 1 wherein the coupling means is constituted by a respective free-wheel drive device between each motor and the output shaft.

3. A drive mechanism according to Claim 1 or 2 wherein the motors have different speeds.

4. A drive mechanism according to any preceding claim wherein the motors are coupled to the output shafts by respective gear mechanisms having different gear ratios.

5. A drive mechanism as claimed in any preceding claim wherein each motor drives a motor shaft which carries a pinion, the pinion being drivingly-coupled to a corresponding pinion on the output shaft by means of a chain.

6. A drive mechanism as claimed in any preceding claim wherein means are provided for braking the second motor.

7. A drive mechanism as claimed in Claim 6 wherein the second motor is braked by means of D.C. injection.

8. A drive mechanism as claimed in any preceding claim comprising a timing device which switches off the first motor and which at a later time initiates braking of the second motor.

9. A drive mechanism according to Claim 8, wherein the timing device sets a period of time between the switching off of the first motor and the initiation of braking of the second motor, said period of time being randomly variable.

10. A drive mechanism as claimed in Claim 8 or 9 wherein the timing device cannot initiate braking of the second motor until the output shaft is drivingly-coupled to the second motor.

11. A drive mechanism according to any preceding claim wherein the output shaft carries a radially-projecting arm which selectively operates a plurality of micro-switches distributed around the shaft.

12. A drive mechanism substantially as hereinbefore described with reference to the accompanying drawings.

13. A gaming machine incorporating a drive mechanism according to any preceding claim.

14. A gaming machine comprising a drive mechanism according to Claim 11 which actuates a plurality of flashing lights connected to the micro-switches.

15. A method of slowing a load in a controlled manner employing a driving mechanism having an output shaft arranged to be coupled to the load and at least first and second motors wherein the first motor may be coupled to the output shaft to drive it at a first rotary speed and the second motor may be coupled to the output shaft to drive it at a second substantially lower rotary speed, the method comprising the steps of initially coupling the output shaft to the first motor so that it is driven at the first rotary speed, disengaging the coupling between the output shaft and the first motor so that the output shaft slows down, and when the output shaft has slowed down to the second rotary speed coupling the output shaft to the second motor so that it is driven at the second rotary speed.

16. A method according to Claim 15, comprising the final step of braking the second motor so that the load comes to a halt.

17. A method of slowing a load in a controlled manner substantially as hereinbefore described with reference to the accompanying drawings.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1981. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.